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Lyon, le 29 avril 2025

Letter of recommendation for Edgar BRUNIAU

I am a permanent CNRS researcher in combinatorics. Therefore I have no teaching duties. Nevertheless, I sometimes propose advanced courses for PhD students in Grenoble or Lyon, and also regular IMO preparation courses at the ENS Lyon and at the ICJ :

http://math.univ-lyon1.fr/homes-www/lass/club.html

We start from High School Mathematics and make excursions into all kinds of subjects. One dimensional complex (Möbius transformations) and two dimensional real projective geometry is very popular. One of our favorite results is the fact that if we look at the $a \times b$ intersection points of curves of degree a and b, and if we know that $a' \times b$ of them lie on a curve of degree a', then the other $a'' \times b$ of them lie on a curve of degree a'', $a' + a'' = a$. In inequalities, we study Jensen, Hölder, Chebyshev, Schur, Newton, Maclaurin, the method of Lagrange multipliers etc. In Number Theory, it's the Chinese Remainder Theorem, Hensel's lemma, Lucas's Theorem, quadratic and cubic residues, primitive roots, Pell's equation etc. We study functional equations and polynomials (uniqueness of the decomposition into irreducible ones in one or several variables) and, last but not least, even some combinatorics : classical graph theory (theorems of König, Hall, Menger, Mader, Gallai-Milgram etc.) and some enumerative combinatorics. Our program might be too advanced to be an ideal IMO preparation. Nevertheless, it is attractive for High School Students from all parts of France (and even Switzerland and Belgium), and almost all members of the French IMO teams take part in it.

Living more than 600 km away from Lyon, Edgar BRUNIAU has heard about those activities only one year ago. Nevertheless, coming to almost all our lessons and eagerly working he has made progress very quickly and certainly belongs already to our best participants.

Bodo Lass

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